

REMARKS

The above-noted amendments to the claims are respectfully submitted in response to the official action dated July 15, 2003, herein. It is believed that these amendments not only overcome the specific technical objections raised by the Examiner in Paragraphs 4-8 of the official action, but as set forth in the following comments and distinctions over the references cited hereagainst, clearly establish the patentable nature of this claimed invention. Therefore, reconsideration and allowance of these claims is respectfully solicited.

Claim 39-63 have been rejected as being unpatentable under 35 U.S.C. § 112, second paragraph. The Examiner initially notes that claim 39 recites the limitation "a porous material . . . comprising a carrier including a first porous structure, an oxidation catalyst . . . enclosed within said first porous structure." In reference to the term "carrier," the Examiner contends that this limitation renders the claim indefinite because it is not clear if the porous material actually includes a carrier, a porous structure and an oxidation or reduction catalyst. However, the above-noted amendments to claim 39 are believed to clarify any potential confusion created by original claim 39. That claim is now specifically directed to a porous material, which itself includes the first porous structure and the oxidation catalyst set forth in the claim. Thus, to the extent that inclusion of a "carrier" was redundant, or added confusion to the claim, it has now been deleted. It is thus believed that these claims have now been clarified. Indeed, similar amendments to various of the dependent claims, including claims 40 and others, have also been made, including deletion of the term "carrier" from each of these claims. It is believed that this has been done merely to clarify the claims, and does not in any way narrow the scope of these claims.

With respect to claim 53, the Examiner contends that the term "overgrowth" renders this claim indefinite. However, applicants believe that the term "overgrowth" is one commonly used by anyone of ordinary skill in this particular field. It is applicants' belief that the term refers to a crystalline structure growing further onto an already existing compatible crystalline structure. For this reason, applicants have not amended claim 53.

The Examiner objects to claim 54 on several bases, but it is believed that the above-noted amendments to this claim eliminate each of these objections, and therefore reconsideration and allowance of this claim is also respectfully solicited.

The Examiner contends that claims 39-63 are unpatentable over Yamada *et al.* under 35 U.S.C. § 102(b). While the Examiner has referred to Japanese Patent No. 7-144128, applicants would instead refer to what applicants believe to be the corresponding U.S. patent relating to Yamada *et al.*; namely, U.S. Patent No. 5,744,103. The Examiner contends that this reference discloses an absorbent composition which absorbs a hydrocarbon and an exhaust gas and that it comprises a zeolite with pores of a larger diameter and a zeolite with pores of a smaller diameter for exhaust gas cleaning, which are physically mixed or laminated. The Examiner contends that the reference teaches a mixture of 8-membered ring crystalline structures such as CHA with a pore diameter of 0.3 to 0.5 nm, 10-membered ring crystalline structures such as NFI, MEL, and FER with pore diameters of 0.4 to 0.6 nm, and 12-membered ring crystalline structures such as FAU and BEA with pore diameters of 0.6 to 0.75 nm.

The Examiner also refers to FIG. 2 and alleges that it teaches the absorption device 3 comprising a cordierite honeycomb support 4 with a coating layer 5 of adsorbent

component, and that as shown in FIG. 4 the coating layer can be a three-layered structure with a first layer of chabazite zeolite, a second layer of ZSM-5 zeolite, and a third layer of faujasite zeolite. It is stated that with respect to FIG. 5 the three zeolites can be physically mixed and then wash coated with a monolithic support. It is said to be further taught that the composition is impregnated with catalytic metal such as platinum and rhodium, and the examples teach that hydrogen form (acetic) NFI-FAU composite is prepared and impregnated with PE and Rh and loaded on a honeycomb support.

The Examiner equates the 8- and 10-membered ring structures of Yamada *et al.* with the first porous structure and the 12-membered ring structure with the second porous structure with a larger pore size, and that the Pt- and Rh-impregnated adsorbents are equated to the oxidation and reduction catalysts claimed herein. The Examiner finally disregards the intended use recitations in these claims, stating that they must result in a structural difference in order to patentably distinguish over the art, citing *In re Casey*, 370 U.S.P.Q. 235, and *In re Otto*, 312 U.S.P.Q. 458.

With respect to the claim limitations requiring that "said first porous structure including pores having dimensions such that said reducing agent is sterically prevented from contact said oxidation catalyst," the Examiner contends that because the zeolites of Yamada meet the pore size range claimed, they would meet the first porous structure, and that similarly that the zeolites also meet the limitation for the second pore size range. This rejection is respectfully traversed in view of the above amendments and arguments and for the reasons set forth hereinafter.

An understanding of the patentable nature of the present claims over the Yamada *et al.* reference must begin with an understanding that the objects of the invention of the

present claims and that of Yamada *et al.* are entirely different. Indeed, for one to take steps to achieve the objectives of Yamada *et al.* effectively eliminates the possibility of achieving the objectives of the present invention. In accordance with Yamada *et al.*, the patentees have attempted to solve the problem of cold starting; i.e., the fact that during engine start-up, attempts to clean exhaust gases run into difficulty when the hydrocarbons contained in the exhaust gases cannot be cleaned with noble metal catalysts because the temperature remains below about 300°C. Yamada *et al.* attempts to overcome this problem using specific zeolites having different pore sizes so as to adsorb both large- and small-size hydrocarbons so that they can both then be cleaned at appropriate temperatures. In this manner, both sizes of hydrocarbons can be adsorbed even at temperatures below 200°C and maintain their adsorption capacity until the relatively higher temperatures are reached.

The Yamada *et al.* disclosure specifically states that the adsorption of the various hydrocarbons into these zeolitic components is also effected with the support member carrying ceria and/or palladium, with the latter being a metal catalyst component for decomposing the hydrocarbons at relatively low temperatures. The disclosure in Yamada *et al.* also contains reference to the cleaning catalyst according to that invention, preferably including a catalytic metal which decomposes not only the hydrocarbon but also NO_x in the exhaust gas, which can also allegedly be effectively decomposed because of the relatively high desorption temperature of the hydrocarbon from the adsorbent component itself. The examples of catalytic metals disclosed in Yamada *et al.* (col. 8, lns. 38-40) include Pt, Ir and Rh.

What is abundantly clear from the overall disclosure of Yamada *et al.* is that, while separating the adsorption and

catalytic functions of the cleaning devices thereof, such as can be seen by referring to FIG. 1 and column 10, lines 20-45 thereof, in which an exhaust gas line first includes an adsorption device 1 and then a catalyst device 2 downstream thereof, the critical elements of this reference require that the hydrocarbon (i.e., applicants' reducing agent) must enter the pores of whatever zeolite is used so that it can be absorbed and/or converted therein; namely, by oxidation.

The basic solution to the problem of cold starting provided by Yamada *et al.* is to provide absorbents for absorbing smaller hydrocarbons in smaller pore sizes and larger hydrocarbons in larger size pores. Indeed, in Example 4 in column 11 of Yamada *et al.*, as shown in FIG. 6 thereof, a three-layered composition of varying pore size zeolites is produced and coated on a honeycombed support 4. This material is specifically tested with a test gas sample as shown in Table 2 at column 12 of Yamada *et al.*, with various hydrocarbons ranging from methane to paraffins and aromatics. The results are said to show that the product of Example 4 demonstrates the most superior overall absorption of hydrocarbons, including methane. This was said to result from the fact that the larger hydrocarbons act as a plug, trapping the smaller hydrocarbons in the smaller pores until temperatures high enough to desorb the larger hydrocarbons are reached. In thus discussing their invention, these patentees specifically state that the desired effects of this invention are best achieved using silicate powders having the 10-membered and 12-membered ring structures and not those with the smaller pore sizes.

On the other hand, it is critical in accordance with the present invention, as set forth in the claims, that the claimed porous material include pores which have dimensions such that the reducing agent is substantially prevented from contacting the oxidation catalyst enclosed within that first

porous structure. It is only in this manner that the oxidation catalyst primarily catalyzes oxidation of NO to NO₂ as compared to oxidation of the reducing agent. The primary objective of Yamada *et al.*, however, and the reason why this patentee prefers the larger pore size zeolites, is to subject the reducing agent (namely, the hydrocarbon) to conversion. The fact that, as an addition, Yamada *et al.* does refer to NO_x conversion, does not alter this fact. Indeed, the present application discusses NO_x conversion at temperatures well above 200°C, while even Yamada *et al.* states that not even the larger hydrocarbons are adsorbed at these temperatures.

It should also be clearly noted that Yamada *et al.*'s simultaneous decomposition (oxidation) of hydrocarbons and NO_x is completely contrary to the objects of the present invention. In addition to preventing oxidation of hydrocarbons in the small pore structures of the present invention, this is essential in order to achieve applicants' purposes. Referring specifically to page 35 of the present application, four competing reactions are noted therein. While preventing oxidation of hydrocarbons in accordance with reaction E, which consumes oxygen, the equilibrium of reaction D is effected, so as to reduce the formation of NO₂ from NO. On the other hand, preventing reaction E from occurring, and having reaction C take place by contacting the hydrocarbons with a reduction catalyst, clearly reduces the conduct of reactions E and F. Once again, allowing decomposition of hydrocarbons in the oxidation reaction as per Yamada *et al.* does not favor the conversion of NO to NO₂ according to reaction D, as well as not favoring the reaction between the hydrocarbons and NO₂ in connection with the reduction catalyst. This could not permit the precise objectives of the present invention to be attained.

It is therefore respectfully submitted that the present claims are clearly and fully patentable over Yamada

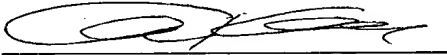
et al., and reconsideration and withdrawal of this rejection is therefore respectfully solicited. If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which she might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

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Respectfully submitted,

By


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